

Integrating Stealth

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Throughout the history of air power, the technological advancements in the offensive weapon systems that are built and introduced onto the battlefield have consistently evolved at a significant pace. One may argue that when you compare these very advancements in offensive capabilities to the advancements in defensive capabilities there are actually no advancements at all, or is much less significant. Over the past two decades the United States has revolutionized the war fighting industry with advancements in Low Observable (LO) technology and precision strike capability.

Advanced LO weapon systems such as the F-35, F-22 and the B-2 have been developed and portrayed as stealth aircraft. In fact, these weapon systems should be portrayed as having stealth technology; specifically in the physical sense referring to low observable. Because LO technology is in a physical form, methods can and have been developed to exploit the inherent weaknesses. Additionally, the technological advancements of social media in today's society impacts the ability to mask the footprint of mobilizing military forces; significantly reducing the element of surprise required to be effective against a near peer country.

The Air Force as a whole needs to re-think our current strategy of air power. Current AF doctrine relies on LO technology to achieve a stealth advantage. This approach is inefficient and rapidly becoming less effective. In order to accomplish this shift in strategy, an entirely new platform of stealth needs to be written into our doctrine; ensuring the concept of stealth is embedded into our culture carrying on to the next generation of Airman. Potential adversaries

¹*The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Air Force, the Department of Defense, or the U.S. Government*

have recognized this and responded by adopting defensive strategies of Anti-Access/Area Denial (A2/AD) in an attempt to locate LO assets and engage precision guided munitions (PGM). The next competitive strategy seeking to maintain an advantage over potential adversaries should not come in the form of any specific aircraft, satellite, or cyber capabilities; the next strategy needs to be a doctrinal and cultural shift, changing how the Air Force thinks, trains, and fights.

Currently, Air Force Doctrine does not define stealth and assumes a reliance on technology in order to achieve a stealth advantage. Changing doctrine to emphasize stealth as a method or means to surprise our adversaries rather than just a single tool will not only increase the effectiveness, but also increases efficiency and combat capabilities by shrouding current weapon systems with a true sense of stealth and deception to hide in plain sight. LO technology is an integral part of this equation, but it cannot stand alone.

The Air Force can employ such methods as putting up decoys every time there is a movement of aircraft. Conducting exercises that specifically allow for true stealth techniques to be implemented and executed allows for simple practices to become a significantly powerful tool for future contingencies. The Air Force needs to be able to rapidly mobilize and maneuver into position anywhere in the world without notice and leave a minimal footprint. Becoming unpredictable needs to be reemphasized and reincorporated at the core of every Airman's daily thought process.

History of Stealth and the United States use of Low Observable Assets

The use of denial and deception (D&D) to defeat an opposing force long outdates any war or conflict. Sun Tzu stated: "*Hence, when able to attack, we must seem unable; when using*

forces, we must seem inactive; when we are near, we must make the enemy believe we are far away; when far away, we must make him believe we are near.” This is a very powerful statement that is still integrated into doctrine today. History has shown numerous examples of how using deception can be a very effective tool. Operation Fortitude was a World War II deception plan that built up several phantom airfields used to deceive Hitler into believing he was being attacked from England rather than Normandy. In 1962, the Soviet Union used Operation Anadyr in an attempt to secretly deploy nuclear ballistic missiles, medium-range bombers and a division of mechanized infantry in Cuba in order to prevent an invasion. Additionally, the Japanese used deception tactics in their information warfare strategy preceding the attack on Pearl Harbor.

Since the mid-1960s significant technological advancements have been made to allow aircraft the ability to penetrate enemy air defenses undetected. Radar Absorbent Material (RAM) placed on flat faceted surfaces allowed aircraft like the F-117 to absorb or deflect incoming radio waves rendering it essentially invisible to early detection and tracking radars. Current aircraft such as the B-2, F-22, and the newly developed F-35 use this same technological principle. There are five specific parameters when thinking about low observable properties: visual, infrared, Radar, acoustical, and radio emissions. It is through the combination of these five areas that allow US aircraft to obtain tactical stealth against modern day threat technology

As low observable technology continued to be developed, detection capabilities have continued to evolve as well. The ability to counter LO has always been there; what has been missing is the ability to fuse all of the data and correlate it into a single picture.¹ Multi-static radar systems, passive coherent location systems, over the horizon radars and infrared detections

systems are just a few examples of capabilities currently developed and fielded. A major focus has been on pursuing more advanced low-band radars, primarily operating in the lower frequency VHF and UHF bands. Numerous digital upgrades to older systems are being developed and marketed as an efficient means to provide an effective capability. While older systems still may not be as accurate as a more modern system, cueing another system to the presence of a possible threat can make a significant difference in the outcome of an engagement.

An example of this technology is the new Russian Nebo-M 3-D radar system. The Nebo-M is composed of three separate radars, a central data fusion unit and a command post module, providing a unique multi-band design. The three separate radars operate at separate locations offsetting in angles to exploit the physical characteristics of LO systems. The different radars operate in the VHF frequency band (RLM-M), L frequency band (RLM-D) and the C/X frequency band (RLM-S); each sending data to the command and data fusion system. Different frequency ranges or bands provide different results. Simplified; the intent is for the RLM-M is to provide initial detection of a LO target then cue the RLM-D and RLM-S radars in order to build target tracking files.^{2, 7} The bottom line is that the technology once demonstrated in Desert Storm more than 20 years ago has dramatically shrunk as numerous countries are attempting to exploit the vulnerabilities of our current technologies to gain a strategic advantage for possible future conflicts.

Defining Stealth for the Modern Air Force

Currently the term “stealth” is only mentioned twice in Air Force Basic Doctrine, Organization, and Command (AFDD-1) and neither of those defined it as a concept. It also remains undefined across many of the Air Force Doctrines, Joint Publications, and glossaries.

When stealth is referenced in these publications it is correlated specifically to LO material or other physics-based applications. Below is a sampling of the current uses of the term “stealth” in Air Force Doctrine and Joint Publications:

Reference	Source
“Precise planning will mitigate and potentially defeat the traditional adversary of surprise, speed, stealth, maneuver and initiative.	Annex 2-0 GIISR pg. 46
“Low Observable (“stealth”) aircraft require special consideration and planning at the air operations center	Annex 3-01 Counterair pg. 23
“Low observable (stealth) technology”	Annex 3-01 Counterair pg. 24
“Stealth and LO technologies are those measures, normally designed into a weapons system”	Annex 3-01 Counterair pg. 38
“The use of stealth aircraft...may reduce operational risk”	Annex 3-40 CCBRN pg. 32
“Stealth aircraft... attack tactical and operational-level targets.”	JP 3-0 Joint Ops pg. 152
“Passive means include... material design features, to include stealth technology”	JP 3-01 Countering Air and Missile Threats pg. 102

Due to the lack of a definition for “stealth” in Air Force doctrine, the force is currently limited in the application of this critical capability. For instance, the current deployment model lacks stealth and broadcasts troop movements to the adversaries. This advanced warning known as “deployment in the open” reduces the element of surprise and allows the enemy to prepare forces and shape the battlefield. Finally, published flight plans and predictable movements reduce the Air Force’s stealth capability.

In contrast to the Air Force’s lack of integration and definition of stealth in doctrine are the approaches of the US Army and Navy. In US Army publication FM 3-97.6, *Mountain Warfare*, soldiers are taught that “forces should move by stealth and exploit the cover and concealment of terrain.” As illustrated by the Army’s use of stealth in doctrine, stealth can encompass much more than physical properties and LO materials. By combining cover,

concealment, random and coordinated movement, the Army is able to employ stealth in the field to gain surprise over the enemy.

To assist in changing how the Air Force embraces this significant cultural change, the Air Force needs to develop a “Stealth” annex to AFDD-1 and ultimately have these new thought processes filter all the way down into the specific Tactics, Techniques, and Procedures (TTPs) used by Airmen each and every day. By incorporating these changes, the Air Force as a whole, will be forced to change the way it fights and become a more efficient, effective, and lethal force in the full range of military operations.

The first step is to define 'stealth.' According to SOS Class 16A Think Tank, stealth is defined as: "*“The art of concealing actions or operations by exploiting an enemy’s weakness or perception to cause misdirection, gain the element of surprise, and leverage a strategic advantage.”*” Stealth in this new strategy needs to be more than a physics-based approach. Stealth needs to integrate deception, misdirection, Operations Security (OPSEC), and misinformation in order to deceive an enemy. Sowing doubt and confusion among potential adversaries will be much more effective, efficient and attainable than the current approach. In tomorrow’s near-peer fight, LO weapon systems will very likely be the leading edge of operations and it should still be that way. However, if the adversary knows when to expect an attack and how it will be advancing, there is an increased risk to effectively counter even our most advanced technology.

Applying Stealth Doctrine to the Current Force

The Air Force has invested very heavily in LO weapon systems as the solution to tomorrow's war with programs such as the F-35 and the F-22. These can dramatically affect the battlefield by crippling the enemy's efforts to detect, identify and engage a target, but history has shown the element of surprise is perishable as other countries continue to develop countermeasures to this technology. The investment in LO technology needs to be supplemented with the appropriate stealth mentality and culture across the entire force to ensure a lasting U.S. advantage. To ensure survivability of our weapon systems and maintain the advantage of stealth; Airmen need to incorporate the art of concealing their actions or operations by causing misdirection, gaining the element of surprise, and leveraging a strategic advantage not only in their daily duties, but also in their daily lives by practicing the simple OPSEC measures that have been in place for years. By Airmen becoming more familiar with the weapon system employment while concurrently understanding the importance in concealing its capabilities, it will enable the Air Force to more effectively assign the appropriate resources to the mission at hand without exposing leading-edge technology to other nation states. TTPs and training are missing from AFDD-1 Doctrine and therefore needs to first be addressed and re-conceptualized at the highest level. Other services like the Navy and Army have developed doctrine that embraces the stealth mentality at the core.

The most important Air Force Doctrine to start the implementation of changing the culture of stealth will be Annex 3-0: Operations & Planning. This is the basis of all the operations that the Air Force performs. The mindset of stealth incorporated into operational and tactical planning will ensure that when the Air Force is planning its operations, it will not focus solely on LO technology as the primary means of surprising the enemy. By incorporating the definition of stealth, Air Force operational planners will leverage multiple techniques to achieve

a strategic surprise, to include such measures as decoys, both air launched and ground-based, false information campaigns, the use of Operation Security (OPSEC) to its maximum extent, and rapid mobility. By altering Annex 3-0 as the primary platform to introduce these techniques into all aspects of military operations, the Air Force can easily begin to incorporate stealth into all the other annexes of Air Force Doctrine to provide the basis of how the Air Force of the future should fight as a service. Once the Air Force has incorporated the basics of comprehensive stealth in the overall doctrine it will begin to make its way into the tactics, techniques and procedures (TTP) utilized at the most tactical levels.

Air Force TTPs provide essential guidance on operations at the tactical level. Providing the guidance at the strategic level with the reformed doctrine, new TTPs can be developed to implement these changes at the tactical level. Air Force TTPs are not limited to platform specific planning guides (AFTTP 3-3 series), instead span the entire spectrum of combat operations to include, but are not limited to, Maintenance, Logistics, Cyberspace Operations, and Civil Engineering. Imagine if the entire Air Force support structure began to think as tactically as the special operations force.

Maintenance and Logistics TTPs could include the use of rapid mobility with light logistical footprints to enable smaller numbers of aircraft to be distributed across multiple bases to complicate enemy targeting. These distributed operations could be supported by lessons learned in the campaigns in Iraq and Afghanistan, with the resupply of Forward Operating Bases (FOBs). Traditionally, airbases have been resupplied with the use of airlift aircraft physically landing and offloading supplies. With the advent of the Joint Precision Aerial Delivery System (JPADS), or the precision a C-130 crew can provide, cargo aircraft no longer have to land to

provide resupply in small areas. The distributed forces could deploy inflatable decoys alongside actual aircraft masking the actual deployed numbers of total aircraft. These deception techniques could be used to cause the enemy to expend excessive resources to match the perceived threat and complicate targeting.

Cyberspace Operations TTPs could include the use of denial and deception tactics to confuse enemy planning. Cyber Operations could redirect information flow to decoy bases or facilities, distracting from actual high value assets in the Area of Responsibility. Cyberspace operators could probe enemy command and control systems, without their knowledge, providing instantaneous feedback to allied command and control on enemy intentions as opposed to shutting down the enemy command and control infrastructure. In addition, Cyberspace operators could infiltrate enemy air defenses and provide false targeting information to prevent the loss of allied aircraft instead of shutting the system down completely. Looking at these examples, redefining stealth in supporting domains as well can achieve immense operational advantages. Now looking to the operations side of TTPs, even greater effects against any potential aggressor can be realized.

There are several things the Air Force can be doing to increase the stealth capabilities of all of its operational platforms. Fighter movements, fighter/bomber missions, and material movements could all see small changes with far reaching effects. First, movements of fighters should be done secretly, quickly, and folded into the regular flight activities of the base. This serves several purposes, if every movement is secretive then the movements that really must be secret, will already have a roadmap. Fighter missions, especially ones where bombs are strapped to the outside of the aircraft, pose an OPSEC risk. These weapons-loaded jets are obvious, and if

the Air Force has more training sorties with various mock weapons, then the real weapons will blend in when they need to be employed. Material movements also have the capability to stealthily move war material.

Conclusion

After years of operating in a primarily permissive non-state actor environment such as Afghanistan, the Air Force is deliberate and obvious in its deployment of personnel and employment of assets. Meanwhile, counter-LO technology has proliferated and potential adversaries are investing heavily in A2/AD capabilities. The Air Force cannot rely on an asset's reduced radar cross section (RCS) as the primary means of achieving a stealth advantage; to do so is inefficient and ineffective. Tomorrow's near-peer fight will require a coordinated effort that supports LO assets, leverages existing capabilities, and introduce doubt and confusion into an adversary's calculus.

Stealth, as a culture, is not a capability that can be developed over night; it is a fundamental change in the way the Air Force thinks, trains, and fights. Units who support airfield operations, scheduling, maintenance, civil engineering, munitions, and many others have a vital role in achieving a stealth advantage. A stealth Air Force can mobilize with little or no indication and position itself to hold any target at risk, anywhere in the world, with no notice. The stealth advantage significantly reduces an adversary's capability in the A2/AD environment because they are taken by surprise and do not know where to focus their efforts. Embracing the concept of stealth at the Air Force level impacts a wide variety of AFSCs and therefore requires a cultural and doctrinal change. Once Air Force doctrine has been established; empowered Airmen will develop the TTPs for stealth airfield operations, integrated support, and

employment. The result of integrating stealth is efficient and effective employment across the full spectrum of conflict that leverages existing capability to boost efficiency, reduces exposure of new technology to reduce cost while preserving combat capability, and reduces operational risk to both LO and non-LO assets. A doctrinal change, incorporating stealth into the way the Air Force executes on a daily basis, will manifest in cost savings and increased combat capability.

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